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L11: Entry 2 of 4 File: USPT Sep 14, 1999

DOCUMENT-IDENTIFIER: US 5951991 A
TITLE: Cleansing products with improved moisturization

BSPR:
The internal phase can optionally comprise other water-soluble or dispersible materials that do not adversely affect the stability of the conditioning emulsion. One such material is a water-soluble electrolyte. The dissolved electrolyte minimizes the tendency of materials present in the lipid phase to also dissolve in the water phase. Any electrolyte capable of imparting ionic strength to the internal phase can be used. Suitable electrolytes include the water soluble mono-, di- or trivalent inorganic salts such as water-soluble halides, e.g., chlorides, nitrates and sulfates of alkali metals and alkaline earth metals. Examples of such electrolytes include sodium chloride, calcium chloride, sodium sulfate, magnesium sulfate, and sodium bicarbonate. The electrolyte will typically be included in a concentration in the range of from about 1 to about 20% of the internal phase.

BSPR:
In addition to these primary emulsifiers, the compositions of the present invention can optionally contain a coemulsifier to provide additional water-lipid emulsion stability. Suitable coemulsifiers include, but is not limited to, phosphatidyl cholines and phosphatidyl choline-containing compositions such as lecithins; long chain C16-C22 fatty acid salts such as sodium stearate; long chain C16-C22 dialiphatic, short chain Cl-C4 dialiphatic quaternary ammonium salts such as ditallow dimethyl ammonium chloride and ditallow dimethyl ammonium methylsulfate; long chain C16-C22 dialkoyl(alkenoyl)-2-hydroxyethyl, short chain C1-C4 dialiphatic quaternary ammonium salts such as ditallowoyl-2-hydroxyethyl dimethyl ammonium chloride; the long chain C16-C22 dialiphatic imidazolinium quaternary ammonium salts such as methyl-1-tallow amido ethyl-2-tallow imidazolinium methylsulfate and methyl-1-oleyl amido ethyl-2-oleyl imidazolinium methylsulfate; short chain C1-C4 dialiphatic, long chain C16-C22 monoaliphatic benzyl quaternary ammonium salts such as dimethyl stearyl benzyl ammonium chloride, and synthetic phospholipids such as stearamidopropyl PG-dimonium chloride (Phospholipid PTS from Mona Industries).

BSPR:
Examples of topical anesthetic drugs include benzocaine, lidocaine, bupivacaine, chlorprocaine, dibucaine, etidocaine, mepivacaine, tetracaine, dyclonine, hexylcaine, procaine, cocaine, ketamine, pramoxine, phenol, and pharmaceutically acceptable salts thereof.

BSPL:
Topical Anesthetics:

CLPR:
16. A product according to claim 1 wherein said cleansing product further comprises a safe and effective amount of one or more active ingredients selected from the group consisting of anti-acne actives, vitamins, anti-wrinkle and anti-skin actives, non-stearoidal anti-inflammatory actives, topical anesthetics, artificial tanning agents and accelerators, anti-microbial and anti-fungal agents, sunscreen actives, anti-oxidants, and mixtures thereof.

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L11: Entry 3 of 4 File: USPT Jan 12, 1999

DOCUMENT-IDENTIFIER: US 5858380 A
TITLE: Stable gelled composition with a high electrolyte content

BSPR:
The present invention relates to a stable gelled composition, in particular a topical composition, which can contain a large amount of electrolyte, and to its use, in particular for the treatment and care of the skin, scalp, mucous membranes, nails and hair.

BSPR:
It is known in the cosmetics, dermatological and pharmaceutical fields to use topical compositions in the form of gels or emulsions containing gelling agents which give consistency to these compositions. The majority of the gelling agents conventionally used are aqueous gelling agents and in particular carboxyvinyl polymers, which are neutralized with a base.

BSPR:
Now, it may be desirable to introduce electrolytes into thickened compositions, in particular topical compositions, and sometimes even in a relatively large amount, in particular when these electrolytes have a beneficial effect on the skin or hair.

BSPR:
One solution consists in using, instead of carboxyvinyl polymers, gelling agents of a polysaccharide type, such as guar or xanthan gums or cellulose derivatives. EP-A-654,270 thus describes a topical composition intended for the treatment of acne and seborrhoeic dermatitis containing a mixture of salts and, as gelling agent, a cellulose derivative, such as hydroxyethyl cellulose.

BSPR:
The composition according to the invention is preferably intended for topical care or treatment. In this case, the composition must contain a topically acceptable medium, that is to say a medium which is compatible with the skin, the mucous membranes, the nails, the scalp and the hair. It can be provided in all pharmaceutical dosage forms appropriate for topical application and in particular in the form of a water-in-oil or oil-in-water emulsion or of an oily dispersion containing a small amount of water, loaded with electrolytes, dispersed in the oily phase. The composition according to the invention can also contain ionic and/or non-ionic lipid vesicles which may or may not contain a dispersed oil. It can constitute, for example, a cream or an ointment.

BSPR:
When the composition of the invention is an emulsion, the proportion of the oily phase can range from 5 to 80% by weight, and preferably from 5 to 50% by weight, with respect to the total weight of the composition. The oils, the emulsifiers and the coemulsifiers used in the composition in the emulsion form are chosen from those conventionally used in the field under consideration. The emulsifier and the coemulsifier are present, in the composition, in a proportion ranging from 0.3 to 30% by weight, and preferably from 0.5 to 20% by weight, with respect to the total weight of the composition. The emulsion can additionally contain lipid vesicles.

CLPR:
11. The composition of claim 1, wherein said electrolyte is present in a concentration ranging from 0.5 to 40 wt. % of the total weight of the composition.

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L11: Entry 4 of 4 File: USPT Apr 2, 1991

DOCUMENT-IDENTIFIER: US 5004598 A
TITLE: Stable and quick-breaking topical skin compositions

PCPR:
This application is a continuation-in-part of application Ser. No. 928,755 filed Nov. 10, 1986, and entitled "Stable And Quick-Breaking Topical Skin Composition" now abandoned.

BSPR:
This invention relates to oil-in-water emulsions which are shelf-stable and which instantaneously break when they come in contact with a salt or an electrolyte. Such emulsions are especially useful in preparing topical cosmetic skin compositions wherein the emulsion breaks on contacting the electrolyte on the skin, thus allowing the coalescence of oil particles in the discontinuous phase. The oil so released functions as a lubricating medium, as a solvent for surface deposits, or as an occlusive film former, to coat the skin surface and to spread other ingredients in the emulsion on the skin.

BSPR:
The basic components of the emulsion are water, oil, and the modified polymer. A neutralizing agent is optionally used to adjust pH to the desired range. Since pH of the skin is about 5.5, it is desirable to adjust pH of topical skin compositions to approximately this pH. It is also possible to use primary surfactants to impart further stability of the emulsion, or to enhance performance attributes such as spreading or penetration of active ingredients, although the modified polymer can function by itself as a primary surfactant.

BSPR:
Oil-in-water emulsions prepared in the manner described above, remained shelf-stable for over 12 months at ambient temperature and over 3 months at 50.degree. C. Three months was the limit of the test, not the limit of stability at 50.degree. C. When exposed to electrolyte in sufficient concentration, the emulsions display instantaneous break resulting in coalescence and release of the oil phase. The break characteristic of these emulsions can be easily achieved by the level of perspiration in normal skin.

BSPR:
Fully formulated topical skin compositions can be prepared with the oil-in-water emulsions disclosed herein by incorporating therein the desired components. Examples of cosmetic skin formulations which can be prepared with the emulsions include moisturizing lotions, barrier creams and lotions, cleansing creams and lotions, waterless hand cleaners, after-shave lotions, sunscreens, and the like.

BSPR:
One class of moisturizing lotions are based on emulsions of mineral oil, petrolatum, or lanolin oils. When these lotions are spread on skin, the oils form an occlusive layer which reduces the trans-epidermal loss of water, i.e., water loss from skin. The water thus retained in the stratum corneum in the skin then plumps the cells of the horny layer of the skin and thus mitigates the dry skin condition. The same benefits are not obtained when water is placed on the skin or when hands are immersed in water. When water is placed

on the skin, it evaporates before it rehydrates the skin. Immersion of the skin in water often results in an abnormal degree of hydration of the stratum corneum, which is frequently accompanied by cellular damage. As a consequence, the stratum corneum loses its property as a moisture barrier, exacerbating the dry skin problem. The use of the oil-in-water emulsions disclosed herein in preparing moisturizing lotions offers extremely good spread of an oil layer on contact with the skin due to the fast-breaking of the emulsion. Furthermore, since the moisturizing lotion and other topical skin compositions referred to herein can be prepared with the modified polymer and without any of the conventional surfactants, the absence of surfactants in the oil layer results in a more effective barrier to trans-epidermal water loss.

BSPR:
Mineral spirits and mineral oil are used in preparing the stable and quick-breaking oil-in-water emulsions which form the basis for most of the various topical skin treating compositions. To identify these materials, a general description of mineral spirits and mineral oil is given herein.

BSPR:
The moisturizing lotion formulations can optionally contain other ingredients such as coemulsifiers or bodying agents, emollients, humectants, spreading agents, preservatives, and fragrances. Commonly used coemulsifiers or bodying agents include long chain alcohols such as cetyl, myristyl and stearyl alcohols which assist stabilization of the emulsion. Coemulsifiers are normally present in the range of 0.2 to 5%. Common emollients are mineral oil, petrolatum, lanolin and derivatives thereof, and alkyl triglycerides such as caprylic/capric triglycerides. Amount of emollient is usually in the range of 1 to 40%. Common humectants are glycerine, sorbitol, and other hydroscopic compounds, all of which at times are considered as emollients because of the water-retentive properties. Normal amounts of humectant varies from 1 to 10%. Common spreading agents include isopropyl myristate and cyclomethicone, which are normally used at a level of 0.1 to 3%. Common preservatives are the parabens and imidazolidinyl urea, which are used at a level of 0.05 to 0.5%. Any suitable fragrance can be used at a level of 0.1 to 2%. Amounts herein are based on the weight of the final formulation.

DEPR:
The Examples that follow demonstrate the herein-disclosed invention as it relates to preparation of stable and quick break oil-in-water emulsions and the use of such emulsions in topical skin compositions.

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L14: Entry 1 of 5 File: USPT Aug 22, 2000

DOCUMENT-IDENTIFIER: US 6106848 A
TITLE: Topically applicable O/W emulsions having high glycol content and at least one biologically active agent

BSPR:
Currently marketed are numerous topical compositions comprising an active agent and a high content of glycol, the latter promoting the penetration of the biologically active agent into the skin. Given the high content of pro-penetrating glycol, these compositions are formulated as emulsions having a high content of fatty phase which are also commonly designated "lipocreams," as anhydrous compositions which are deemed "ointments," as fluid compositions having a high content of volatile solvents, such as ethanol or isopropanol, which are destined for application to the scalp, i.e., "hair lotions," or, alternatively, as viscous O/W emulsions which are also designated "O/W creams."

BSPR:
To facilitate the application of topical compositions comprising a high percentage of glycol, it would be desirable to provide novel formulations of the O/W emulsion type, whose viscosity would be intermediate between the hair lotions which are too fluid and the use of which is too limited, and the O/W creams which are too viscous and which have a fatty and sticky characteristic, while preserving the propenetrating properties of the glycol.

BSPR:
Moreover, the compositions according to the invention may comprise from 0% to 3% by weight, preferably from 0% to 2% by weight, relative to the total weight of the composition, of at least one coemulsifier which is advantageously selected from among esters of saturated or unsaturated fatty acids, which are natural or synthetic, in particular oleic acid or (iso)stearic acid, such as the esters of polyglycerin and isostearic acid which are marketed under the trademark LAMEFORM TGI by SIDOBRE-SINNOVA HENKEL, sorbitan isostearate marketed under the trade mark ARLACEL 987 by ICI, sorbitan sesquioleate marketed under the trademark ARLACEL 83 by ICI, the esters of glycol and isostearic acid such as PEG-6 isostearate marketed under the trademark OLEPAL ISOSTEARIQUE by GATTEFOSSE, the esters of sorbitol and oleic acid such as the polysorbates marketed under the trademark TWEEN by ICI, the fatty alcohol ethers, in particular oleyl alcohol, in particular the esters of glycol and oleyl alcohol, such as the oleths marketed under the trademark BRIJ by ICI, oxyethylenated sorbitan monostearate, the fatty alcohols such as stearyl alcohol or cetyl alcohol.

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L14: Entry 3 of 5 File: USPT Oct 12, 1999

DOCUMENT-IDENTIFIER: US 5965145 A
TITLE: Use of honey as keratolytic agent for improving the radiance and the complexion of the skin and treating wrinkles

BSPR:
The invention relates to a cosmetic or dermatological composition containing honey as a keratolytic agent and a method of applying same for improving the radiance of the complexion, smoothing the skin of the human face or body, or for treating wrinkles and fine lines. It also relates to a topical composition containing honey and at least one fatty alcohol. It relates also to a topical composition containing honey and at least one hydroxy acid, which composition is buffered at pH 5 and makes it possible to gently combat the ageing of the skin of the human face and/or body.

BSPR:
Preferably, the composition of the invention containing honey includes a cosmetically and/or dermatologically acceptable medium, that is to say compatible with the skin, the scalp and the hair. It can be provided in all the pharmaceutical dosage forms normally used for a topical application, in particular in the form of an aqueous, aqueous/alcoholic or oily solution, of an oil-in-water or water-in-oil or multiple emulsion, of an aqueous or oily gel, of a liquid, pasty or solid anhydrous product or of a dispersion of oil in an aqueous phase with the use of spherules, it being possible for these spherules to be polymeric nanoparticles, such as nanospheres and nanocapsules, or better still lipid vesicles of ionic and/or non-ionic type.

BSPR:
When the composition of the invention is an emulsion, the proportion of the fatty phase can range from 5 to 80% by weight and preferably from 5 to 50% of the total weight of the composition. The oils, the emulsifiers and the coemulsifiers used in the composition in the emulsion form are chosen from those conventionally used in the field under consideration. The emulsifier and the coemulsifier are present in the composition in a proportion ranging from 0.3 to 30% by weight and preferably from 0.5 to 20% of the total weight of the composition. The above ranges include all values and subranges therebetween.

BSPR:
Preferably, as emulsifiers and coemulsifiers which can be used in the invention, for example, are esters of fatty acid and of polyethylene glycol, such as PEG-40 stearate or PEG-100 stearate, or esters of fatty acid and of polyol, such as glyceryl stearate and sorbitan tristearate.

CLPV:
optionally 0.3-30 weight percent of an emulsifier or coemulsifier selected from the group consisting of PEG-40 stearate, PEG-100 stearate, glyceryl stearate and sorbitan tristearate.

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L14: Entry 4 of 5 File: USPT Jan 26, 1999

DOCUMENT-IDENTIFIER: US 5863544 A
TITLE: Cosmetic/dermatological w/o emulsions highly concentrated in hydroxy acids

BSPR:
The present invention relates to novel cosmetic/dermatological compositions for topical application, comprising water-in-oil emulsions containing a high content of hydroxy acids, for therapeutic treatment or care of the skin, nails or hair and/or of the scalp, and to the use of same, in particular for treating and/or preventing xerosis, ichthyosis, actinic keratosis and/or photoinduced cutaneous aging.

BSPR:
U.S. Pat. No. 4,772,592 describes a stable water-in-oil emulsion for topical application, for treating acne, which includes a C.sub.1 -C.sub.4 alkyl lactate, a silicone oil, a nonionic liquid emulsifier and C.sub.1 -C.sub.4 alkanol, these constituents being present in specific amounts. Volatile polar liquids such as the alkyl lactate and the alkanol are essential ingredients of this emulsion because, together with the silicone oil, they stabilize the emulsion. However, C.sub.1 -C.sub.4 alkanols present the disadvantage of being irritants to the skin or to the mucosae and hence of contributing to the aforesaid discomfort caused by the hydroxy acids.

BSPR:
These coemulsifiers may be employed either alone or in admixture.

BSPR:
The compositions according to the invention are particularly useful for topical application, for the therapeutic treatment or care of the skin, nails, hair and/or of the scalp, and preferably for treating and/or preventing xerosis, ichthyosis, actinic keratosis and/or photoinduced cutaneous aging.

CLPR:
1. A topically applicable cosmetic/dermatological composition adopted for the therapeutic treatment or care of human skin, nails, hair or the scalp, comprising a water-in-oil emulsion containing (a) from 10% to 30% by weight of at least one hydroxy acid selected from the group consisting of glycolic, lactic, malic, tartaric, citric, mandelic, salicylic, 5-n-octanoylsalicylic acid, 5-n-dodecanoylsalicylic acid, 2-hydroxy-3-methylbenzoic acid, and 2-hydroxy-3-methoxybenzoic acid; (b) from 1 to 15% by weight of at least one polyoxyalkanylated silicone having the structural formula (I) ##STR2## in which PE is a radical (--C.sub.2 H.sub.4 O).sub.x (--C.sub.3 H.sub.6 O).sub.y --R, wherein R is a hydrogen atom or an alkyl radical having from 1 to 4 carbon atoms, x is a number ranging from 10 to 100 and y is a number ranging from 0 to 80; m is a number ranging from 1 to 25; n is a number ranging from 10 to 200; o is a number ranging from 0 to 100; p is a number ranging from 7 to 17; and q is a number ranging from 0 to 4; and (c) an effective coemulsifying amount of at least one polyol alkyl ester, compound contained in an amount ranging from 0.1 to 6% by weight which is selected from the group consisting of polyglycerol isostearate, sorbitan isostearate, sorbitan glycerol isostearate, methylglucose sesquistearate, myristyl alcohol ether, polypropylene glycol ether, and with the proviso that said composition is devoid of any C.sub.1 -C.sub.4 alkanol.

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L19: Entry 2 of 2 File: USPT Nov 2, 1999

DOCUMENT-IDENTIFIER: US 5976555 A
TITLE: Topical oil-in-water emulsions containing retinoids

ABPL:
Skin care compositions comprising an oil-in-water emulsion base containing retinoids and possessing good physical and chemical stability. More particularly, said skin care compositions contain (a) an emulsifier system selected from the group consisting of: (i) a mixture of glyceryl stearate and polyethylene glycol 100 stearate; (ii) cetearyl alcohol and cetearyl glucoside; (iii) a mixture of a polyethylene glycol ethers of stearyl alcohol; and (iv) a mixture of sorbitan stearate and polysorbate 60; (b) a co-emulsifier selected from the group consisting of cetyl alcohol, stearyl alcohol and mixtures thereof; (c) an oil phase present in the amount of from about 5 to about 20 percent by weight of the total emulsion composition which contains (i) a light, dry absorbable oil and (ii) substantive, emollient oils or waxes, wherein the light, dry absorbable oil and the substantive oil or wax are present in a ratio of from about 1:3 for about 10:1.

BSPR:
This invention relates to skin care compositions which may contain retinoids and other ingredients which generally improve the quality of the skin, particularly human facial skin. More particularly, the present invention relates to chemically stable skin care compositions comprising an oil-in-water emulsion and certain retinoids and to methods for making such compositions. This invention also relates to packaging and methods of packaging such compositions so as to preserve their chemical stability.

BSPR:
Skin care compositions containing retinoids have become the focus of great interest in recent years. Retinoic acid, also known as Vitamin A acid or tretinoin, is well-known for the treatment of such skin conditions as acne and products containing retinoic acid are commercially available in various forms from the Dermatological Division of Ortho Pharmaceutical Corporation. Such products, for example, include Retin A* creams, an oil-in-water emulsion of retinoic acid containing as an oil-soluble antioxidant, butylated hydroxytoluene (BHT); Retin A* liquid, a solution of retinoic acid in a polyethylene glycol/ethanol solvent employing BHT as an antioxidant; and Retin A* gel, which comprises retinoic acid in a gel vehicle comprising ethyl alcohol as the solvent, hydroxypropyl cellulose as the thickener or gelling agent and BHT as an antioxidant. These retinoic acid containing products have proven stable and capable of providing active ingredients after extended periods of storage.

BSPR:
In formulating products containing such retinoids, the same properties sought with respect to the retinoic acid formulas are desirable for other retinoid containing compositions. Specifically, much attention is directed toward providing a composition which is aesthetically pleasing and which can deliver active ingredients after a substantial shelf life. Not surprising, in formulating products containing such retinoids, the art is led to the experience gained in the already existing formulas containing retinoic acid. Typically, such formulas comprise oil-in-water emulsions wherein the retinoic

acid is carried within the oil phase and is protected from oxidation by employing an oil-soluble antioxidant. With respect to the form of the emulsion, oil-in-water emulsions have been preferred in that, as compared to water-in-oil emulsions for example, they are non-occlusive, non-greasy, compatible with other such emulsion products, easy to remove from the skin and are regarded as more aesthetically pleasing as well as being more economical to manufacture. With respect to chemical stability of the active ingredient, it has been experienced that the retinoic acid in the oil phase is, in the main, well protected by including in such oil phase an oil soluble antioxidant.

BSPR:
Thus, various oil-in-water emulsions containing retinoic acid and BHT, as oil-soluble antioxidant have been described and sold, for example, in U.S. Pat. No. 3,906,108, U.S. Pat. No. 4,66,805, and U.S. Pat. No. 4,247,547. The retinoic acid containing compositions described in these patents have proven to be, or are said to be, chemically stable. Therefore, a number of skin care products have appeared in the marketplace incorporating other retinoids, including, for example, retinol, retinal and retinyl esters such as retinyl acetate and retinyl palmitate, and these unsurprisingly emulate the formulas of the commercial retinoic acid compositions, i.e., are oil-in-water emulsions protected by oil-soluble antioxidants. Unfortunately, it has been found that these other retinoids in such compositions quickly lose their activity and either oxidize or isomerize to non-efficacious chemical forms with the result that the amount of retinoid actually available to provide the beneficial effects of the product is reduced, in an unacceptably short period of time, to an ineffective quantity and eventually to only trace quantities.

BSPR:
There have been attempts to formulate a stable composition comprising retinol, retinal, retinyl acetate and retinyl palmitate in oil-in-water emulsions, such as in U.S. Pat. No. 4,826,828. Avon Products, Inc., the assignee of U.S. Pat. No. 4,826,828, sells two skin care products called Bioadvance and Bioadvance 2000. Each of these products is supplied in two bottles, portions of which are mixed together just prior to use. U.S. Pat. No. 4,720,353 (Bell) describes water-in-oil emulsion carriers for various medicaments and drugs intended for topical application to the skin. Other water-in-oil type emulsions have been described in EP 0 343 444 A2 (Siemer et al.) and EP 0 330 496 A2 (Batt).

BSPR:
Clum et al., in U.S. patent application Ser. No. 07/719,264, now abandoned, describe stable water-in-oil compositions containing a retinoid and a stabilizing system selected from the group consisting of: (a) a chelating agent and at least one oil-soluble antioxidant; (b) a chelating agent and at least one water-soluble antioxidant; and (c) an antioxidant present in each of the oil and water phases of the emulsion. This composition retains at least about 60% of the retinoids after 13 weeks of storage at 40.degree. C. Although this system is quite stable and useful in retinoid-containing products, it is nevertheless a water-in-oil emulsion and retains all the attributes, advantages and disadvantages of such a formulation. It is therefore an object of this invention to provide an oil-in-water formulation which is stable and acceptable for use on the skin.

BSPR:
In accordance with the present invention, it has now been unexpectedly found that certain retinoids may be successfully stabilized against chemical degradation by incorporating them into oil-in-water emulsions comprising a specifically defined stabilizing system. In addition, this invention relates to oil-in-water emulsion compositions which are cosmetically elegant.

BSPR:
As used herein, the "chemical stability" or "stability" of a retinoid is defined in terms of the percentage of the specified retinoid which is retained in its original chemical form after the composition has been stored for a specified period of time at a specified temperature. Thus, if the original

concentration of all-trans retinol in an absolute ethanol solution were 0.20% by weight and, after two (2) weeks' storage at room temperature (21.degree. C..+-.1.degree. C.), the concentration of all-trans retinol were 0.18% by weight, then the original solution would be characterized as having a chemical stability of 90% after two weeks' storage at room temperature. In the same fashion, if an emulsion comprising all-trans retinol had an initial concentration of 0.30% by weight and after storage for 13 weeks at 40.degree. C. had a concentration of all trans-retinol of 0.24% by weight, then the original emulsion retinol of 80% after 13 weeks storage at 40.degree. C.

BSPR:
Accordingly, there is provided, in accordance with the teachings of this invention, a skin care composition comprising an oil-in-water emulsion and a retinoid selected from the group consisting of retinol, retinal, retinyl acetate, retinyl palmitate and mixtures thereof, said composition having a pH of between about 4 and about 10; said composition further comprising an oil phase, said oil phase having a relatively low level of unsaturation; said composition further comprising a stabilizing system selected from the group consisting of:

BSPR:
Additionally, there are provided herein oil-in-water emulsions having novel emulsification systems. The oil-in-water emulsion compositions of this invention preferably contain:

BSPR:
As described above, the composition of the invention is in the form of a particular type of emulsion, namely oil-in-water. As used herein, the generally accepted concept of an emulsion applies, i.e., an intimate mixture of two immiscible liquids which remains unseparated for an acceptable shelf life at or about room temperature. Ordinarily, when two immiscible liquids are mechanically agitated, both phases initially tend to form droplets. Thereafter, when the agitation ceases, the droplets quickly coalesce, and the two liquids tend to separate. On the other hand, an emulsion may be formed and physically stabilized and the lifetime of the droplets in intimate mixture materially increased if a compound, referred to as an emulsifier, is added to the immiscible liquids. Usually only one phase persists in droplet form for a prolonged period of time, and this is referred to as the internal phase which is surrounded by an external phase. An oil-in-water emulsion is one in which the external phase (also called the continuous phase) comprises water or an aqueous solution and the internal phase (also called the discontinuous or disperse phase) comprises an oil or mixture of mutually soluble oils.

BSPR:
A suitable vehicle for delivery of skin care active ingredients should combine a variety of features. It should be esthetically acceptable for its intended use, i.e. it should be compatible with other products including color cosmetics, it should be low or lacking in odor, easy to apply and spread, quickly absorbed and should leave a non-greasy but perceptibly functional residue. It should also be easily and quickly produced, cost-effective and have suitable physical stability under a variety of adverse conditions, such as high and low temperatures. It should also have a relatively long shelf life under normal commercial and residential environmental conditions.

BSPR:
In order to maintain the droplets as separate entities, and to prevent the phases from separating, accessory emulsifiers or "co-emulsifiers" are often utilized. These co-emulsifiers prevent the oil phase from coalescing or creaming and keep the phases physically stable as an emulsion prior to application to the skin. They lend "body" to the emulsion and give the formulation its character as a lotion or a cream by imparting viscosity to the composition. It has been found that particularly useful co-emulsifiers are fatty alcohols such as cetyl and stearyl alcohols and the like. Preferably, a mixture of cetyl and stearyl alcohols should be used as the co-emulsifier in most cases. Preferably, the ratio of cetyl alcohol to stearyl alcohol should

be from about 2:1 to about 1:2. Preferably, the co-emulsifier should compose from about 1 to about 5 weight percent of the composition. The preferred ratio of emulsifier to co-emulsifier is from about 3:1 to about 1:10. More preferably, the ratio should be from about 3:1 to about 1:3.

BSPR:
The present invention also provides oil-in-water emulsion compositions containing at least one retinoid compound wherein the physical stability of the emulsion and the chemical stability of the active ingredients are excellent. The present invention also provides a method for making such emulsion compositions and a method and apparatus for storing such emulsion compositions in order to maintain their stability during storage and prior to use by the consumer. It should be noted, however, that the base emulsion, including the emulsifiers, co-emulsifiers and oil phase, of this invention may be used not only in combination with retinoids, but with a variety of active topical ingredients with or without the inclusion of retinoid materials.

BSPR:
The skin care compositions of the present invention comprising an oil-in-water emulsion can be in the format of cream or lotion formulations, as desired, by varying the relative quantities of the oil and water phases of the emulsion. The pH of the compositions should be in the range of from about 4 to about 10; preferably they should be from about 6 to about 8. It has been found that, in compositions having a pH of about 6 or more, the retinoid is more stable than at pH of less than 6. Furthermore, the stability of the retinol is less dependent upon the actual materials used in the formulation at pH of 6 or more.

BSPR:
When the emulsion compositions of this invention are applied to the skin, the aqueous portions of the compositions volatilize, while the non-volatile portion of the compositions of this invention remain upon the skin. The oil phase components along with the co-emulsifiers and emulsifiers make up this non-volatile portion of the compositions. Thus, the esthetics of the non-volatile portion are quite important in making the compositions of this invention.

BSPR:
It is desirable to compose an oil phase containing both at least one "dry" absorbable emollient oil and at least one substantive oil or wax. A dry absorbable emollient oil is needed for the purpose of quickly absorbing the composition into the skin. This dry absorbable emollient oil is generally not greasy, a desirable attribute. However, this attribute can be unpleasant if the dry absorbable oil is the only oil in the oil phase. Because such an oil is easily absorbed, it leaves no positive "feel" on the skin. Therefore, it should be balanced with one or more substantive skin conditioning oils or waxes, which are soothing and coat the skin, leaving an "afterfeel" perceptible to the user. These substantive oils and waxes have these desirable traits, but, when used in excess, can leave a greasy feeling on the skin. Thus, the benefit of the emulsion base of this invention is that it balances the esthetics of the compositions with respect to the oil phase and has the capability of rebalancing it with respect to other ingredients which may provide active skin conditioning and/or therapeutic benefits. Preferably, the ratio of dry absorbable emollient oil to substantive skin conditioning oils is from about 1:3 to about 10:1. More preferably, the ratio is from about 1:3 to about 5:1. Most preferably, the ratio should be about 1:1. The dry absorbable emollient is most preferably C12-15 alkyl benzoate (commercially available as Finsolv TN from Finetex), capric-caprylic triglycerides (commercially available from Huls as Miglyol 812) or other suitable synthetic triglycerides known to those of skill in the art. Substantive oils or waxes may be selected from white petrolatum, octyl hydroxystearate, cetyl palmitate and the like. The total amount of oil phase may vary from a very low level, e.g., about 2% of the overall composition, to as much as about 20% of the composition. More preferably, the oil phase should be composed of from about 5 to about 12% of the composition in order to provide the desired spreadability and consistency

without leaving excessive residue with the perception of greasiness and oily coating on the skin. Variations within this range may depend upon the characteristics of the additional components, including vitamins, sunscreens and the like, both to serve as a vehicle to apply the active ingredients properly to the skin and to modify the sometimes undesirable esthetics contributions from these components.

BSPR:
In addition to such oils, other emollients and surface active agents have been incorporated in the emulsions, including glycerol trioleate, acetylated sucrose distearate, sorbitan trioleate, polyoxyethylene (1) monostearate, glycerol monooleate, sucrose distearate, polyethylene glycol (50) monostearate, octylphenoxypoly (ethyleneoxy) ethanol, decaglycerin penta-isostearate, sorbitan sesquioleate, hydroxylated lanolin, lanolin, triglyceryl diisostearate, polyoxyethylene (2) oleyl ether, calcium stearoyl-2-lactylate, methyl glucoside sesquistearate, sorbitan monopalmitate, methoxy polyethylene glycol-22/dodecyl glycol copolymer (Elfacos E200), polyethylene glycol-45/dodecyl glycol copolymer (Elfacos ST9), polyethylene glycol 400 distearate, and lanolin derived sterol extracts, glycol stearate and glycerol stearate; alcohols, such as cetyl alcohol and lanolin alcohol; myristates, such as isopropyl myristate; cetyl palmitate; cholesterol; stearic acid; propylene glycol; glycerine, sorbitol and the like.

BSPR:
Preferably, a detackifying material should be incorporated into the compositions of this invention. When emulsions are applied to the skin, they break apart. Often, they leave a sticky feeling as they dry before the emulsion has totally broken and been absorbed into the skin. This is particularly true of emulsions containing cetyl and stearyl alcohols, due to the liquid crystal nature of these materials, as they are quite slow to give up water upon application to the skin. Unexpectedly, it has been found that certain detackifying materials may be added to the compositions of this invention in order to combat this stickiness. Materials having a "talc-like" character, i.e., which crystallize into a plate-like form, are preferable for use as they add lubricity to the compositions of this invention. Other non-platey solids, although less preferably, are also acceptable for use as a detackifier. Preferably, the detackifying material used in the compositions of this invention should be lauroyl lysine, titanium dioxide, zinc oxide, pulverized nylon, oatmeal and surface treated oatmeal, silica, mica, barium sulfate, aluminum starch, octenyl succinate, micronized polyethylene, boron nitride, corn starch, talc or silicone waxes or oils and other insoluble particles which do not leave visual residue on the skin. More preferably, the detackifying material should be lauroyl lysine, boron nitride, mica and talc. Most preferably, the detackifier should be lauroyl lysine (such as Amihope LL commercially available from Ajinomoto). Preferably, the detackifier is present at very low concentrations, i.e., from about 0.01 to about 7% by weight. More preferably, it should be present at the amount of from about 0.5 to about 1% by weight. Other detackifying materials which are compatible with fatty emulsions would also be appropriate for use in the compositions of this invention.

BSPR:
Surprisingly, it has also been found that small concentrations of lower alkyl alcohols also contribute an esthetically benefit to the compositions of this invention. It has been found that the addition of lower alkyl solvent alcohols mitigate the waxy feel of the emulsions on the skin due to the presence of cetyl and stearyl alcohols. It is believed that lower alkyl alcohols assist in solubilizing the liquid crystal structures formed by these fatty alcohols. Preferably, lower alkyl alcohols having from one to four carbon atoms are useful in the compositions of this invention. Most preferably, ethyl alcohol should be present in the compositions of this invention. Preferably, they should be present in an amount of from about 2 to about 10% by weight of the compositions.

BSPR:

The retinoid compounds which are useful in the compositions of the present invention consist of Vitamin A alcohol (retinol), Vitamin A aldehyde (retinal) and Vitamin A esters (retinyl acetate and retinyl palmitate), although other retinoids may be incorporated into the emulsion compositions of this invention. These retinoids are utilized in the compositions of the present invention in a therapeutically effective amount that may range from about 0.001 to about 5% by weight of the total compositions, preferably from about 0.001 to about 1%.

BSPR:
Additional active ingredients having topical activity may be utilized in the compositions of this invention. Azole-type anti-fungal and anti-bacterial agents may be employed in the compositions of this invention in their base form. For example, ketoconazole, miconazole, itraconazole, metronidazole, elubiol, and like related imidazole antifungals and antibacterials are useful in the topical formulations of this invention.

BSPR:
The compositions of the present invention can be prepared by well-known mixing or blending procedures. Each phase of the emulsion is preferably separately prepared with all of the components contained in the appropriate phase, except that it is usually preferred to omit the retinoid compound initially. The emulsion is then formed normally by adding the oil phase to the water phase with agitation. Preferably, the water phase should be added into the oil phase, as it results in increased stability. It is preferred that the portions be prepared under oxygen-depleted atmosphere such as a nitrogen or argon gas blanket. Most preferably, argon or nitrogen gas is bubbled through the water phase prior to phasing in the oil phase. Commercially, it is envisioned that such oxygen depleted atmosphere may be obtained by operating under vacuum conditions and that the product be stored, prior to use, in blind-end containers, preferably aluminum tubes.

BSPR:
It has also been found that by using a pouch-type container in which a composition is out of contact with oxygen, the composition can be used as not only a water-in-oil type emulsion but also an oil-in-water type emulsion. Further, even after use is begun, the contact with oxygen can be blocked, making it possible to substantially prevent decomposition or degradation of the retinoid in the skin care composition.

BSPR:
The two-part container of this invention can be used, as is apparent from the foregoing explanation, in not only the retinoid-containing skin care composition but also liquid substances of various forms, e.g., an emulsion, a suspension, an aqueous solution and an oil. Especially, it is suitable for storage of substances required to protect the content from an external environment such as air.

BSPL:
where A is the percentage of the unsaturated oil or fat used in an oil-in-water emulsion and B is the iodine value of the unsaturated oil. If a mixture of oils is used in the oil phase, the total unsaturation density will be the sum of all individual C values. Accordingly, an oil phase having an unsaturation density or total C of 1200 or less and preferably 500 or less should be used in the formulations of this invention. It is theorized that saturated oils and/or fats are less reactive than unsaturated oils and fats, due to the presence of reactive double bonds in unsaturated oils and fats, which can initiate reactions with the retinoids and other materials in the compositions of this invention. Synthetic oils that are useful are fatty acid esters, fatty alcohols, for example, octyl hydroxystearate, cetyl palmitate, cetyl alcohol, glyceryl stearate and PEG-100 stearate, stearyl alcohol, octyl pelargonate and the like. Examples of preferred oils are as follows: Finsolv TN (available from Finetex of New Jersey), Miglyol 812 (available from Huls Corporation of New York), silicone oil (Dow Corning of Michigan), mineral oil, and the like, having very low iodine values are also quite useful in the

compositions of this invention. Furthermore, the percentage of the oil present in the compositions of this invention is also relevant: the lower the percentage of high-iodine value oil, the more stable the retinoid in the composition.

BSPV:
d) a chelating agent and an antioxidant present in each of the oil and water phases of said emulsion;

BSPV:
c) an oil phase present in the amount of from about 2 to about 20 percent by weight of the total emulsion composition comprising:

DEPR:
The formulations of this Example 1 were prepared by first creating the water phase and then creating the oil phase. After both phases were created, they were mixed together and retinol added. The water phase was made by first weighing deionized water into a beaker and, with mixing at high speed, slowly adding carboxy polymer (carbomer). The mixture was then stirred for a few minutes. EDTA and ascorbic acid were added to the mixture and mixing was continued for forty-five minutes or until well-dissolved. The water phase was then heated to 80.degree. C., at which time propylene glycol was added. To make the oil phase, all ingredients of the oil phase were weighed and added together in a separate beaker. The oil phase was then heated to 80 C. with mixing until homogeneous. The oil phase was then slowly phased into the water phase with mixing. After phasing, the emulsion was apportioned into four parts and sodium hydroxide was added at 80.degree. C. to each portion separately in order to adjust the pH of the emulsion. The portions were adjusted to have pH of 4.5, 6.0, 7.0 and 9.0, respectively. After mixing for ten minutes, the emulsion was cooled to 45.degree. C. Retinol 40% was then added to the emulsions and the emulsions mixed until homogeneous. The procedure was carried out under yellow light and under an argon blanket so as to minimize exposure to oxygen. Retinol concentrations were measured in accordance with the general HPLC procedure set forth below in Example 2, however, a different column was used containing a mobile phase of 65% acetonitrile, 35% phosphate buffer and a C18 column and a UV detector at 325 nm.

DEPR:
The four emulsions were again apportioned into two parts each, and one of each part held at 50.degree. C., the other part held at 40.degree. C. The stability of all four emulsions was measured over a period of eight weeks. The stability data is set forth below in Table 1.

DEPR:
An oil-in-water emulsion was prepared in accordance with the procedure set forth in Example 1, using the components set forth below. Again, the emulsion was divided into four parts and the pH adjusted, this time to 4.5, 6.0, 8.0 and 10.0. Each part was further divided into two portions, one being held at 40.degree. C. and one held at 50.degree. C. for a period of seven weeks.

DEPR:
In yet another formulation, a retinol-containing composition was made for topical use. The composition was made in accordance with Example 1 above. The ingredients were as follows:

DEPR:
Two other formulations containing retinaldehyde were made as follows. Deionized water was weighed into a beaker and with mixing at high speed, carbomer was added slowly. After a few minutes, EDTA was added, as well as ascorbic acid. Mixing was continued for about 45 minutes until the mixture was uniform. The mixture was heated to 80.degree. C. and propylene glycol added. In a separate beaker all oil phase ingredients were placed. The beaker was heated to 80.degree. C. with mixing until homogeneous. The oils were then slowly phased into the water phase with mixing. Sodium hydroxide was added at 80.degree. C. and the emulsion mixed for about ten minutes. Cooling was begun.

At 35.degree. C., benzyl alcohol was added. The batch was q.s. to 997 gm weight with water. The emulsion was mixed until uniform, about five minutes. The batch was then split into two portions. To one batch was added ethanol and retinaldehyde which had been premixed and dissolved. To the second batch was added a premix of ethanol, citral and retinaldehyde. The batches were then filled into blind aluminum tubes and stored at 40.degree. C. for thirteen weeks. The formulations were as follows:

DEPR:
Skin care compositions containing retinol with and without octylmethoxycinnamate were prepared in an oil-in-water emulsion having the formulations set forth below. The method of preparation was similar to those of preceding examples.

DEPR:
The vessel was then heated to about 70.degree. C. At 70.degree. C., glycerin and EDTA were added. The composition was held at this temperature and mixed until the ingredients were dissolved. The water phase was then neutralized with TEA. The oil phase was then prepared separately by measuring all oil soluble ingredients into a suitable vessel, as follows: C12-15 alkyl benzoate, glyceryl stearate and PEG 100 stearate, white petrolatum, cetyl palmitate, cetyl alcohol and stearyl alcohol. The oil phase was then heated to 70.degree. C. and the propylparaben and methyl paraben were added. The water phase was then slowly introduced to the oil phase, forming the emulsion. The emulsion was permitted to cool. When the temperature of the emulsion reached 35.degree. C., the alcohol was added and the emulsion mixed until uniform. The batch was weighed and water added to compensate for evaporation upon heating. pH was measured and adjusted.

DEPR:
The oil phase was heated to 75.degree. C. and the propylparaben and the methylparaben added. With the temperature of both phases at 75.degree. C., the oil phase was slowly introduced to the water phase. The system was neutralized with TEA. The batch was homogenized for a minimum of 1 minute. The steps of introducing the phases coupled with homogenization, resulted in emulsion formation. The batch was weighed and water added to compensate for evaporation upon heating. pH was measured and adjusted.

DEPR:
An emulsion was prepared in accordance with this invention which did not contain a lower alkyl alcohol or detackifying material. The emulsion was prepared in accordance with the procedure set forth in Example 15 and contained the following ingredients:

DEPR:
An emulsion in accordance with the compositions of this invention was prepared containing a detackifying material, lauroyl lysine, but without a lower alkyl alcohol, having the following ingredients:

DEPR:
An emulsion in accordance with the compositions of this invention was prepared containing a lower alkyl alcohol, but without a detackifying material, lauroyl lysine, having the following ingredients:

DEPR:
An emulsion in accordance with the compositions of this invention was prepared containing both a lower alkyl alcohol, and a detackifying material, lauroyl lysine, having the following ingredients:

DEPL:
The formulation of this Example 7 was found to be quite stable and is an acceptable emulsion for use on the face and other skin.

DEPL:
The formulation of this Example 8-I is quite stable and is an acceptable

emulsion for use on the face and other skin. After thirteen weeks of storage at 40C., 97% of the initial level of all-trans retinol was present in the composition of this example.

DEPL:
The formulation of this Example 8-II is quite stable and is an acceptable emulsion for use on the face and other skin. After thirteen weeks of storage at 40.degree. C., 88% of the initial level of all-trans retinol was present in the composition of this example.

DEPL:
This formulation was functional as an emulsion, but exhibited some drag on application and tacky on drydown during application to the skin and was somewhat grainy in texture.

DEPL:
This product was esthetically satisfactory, however, additional amounts of lauroyl lysine would most probably not provide additional esthetic benefit and may produce pastiness in the emulsion.

CLPR:
1. A topical oil-in-water emulsion composition comprising:

CLPV:
c) an oil phase present in the amount of from about 2 to about 20 percent by weight of the total emulsion composition comprising: